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Letters to the Editor

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Sir,

We write to comment on the article by Kirveskari and Jämsä (2009). Therein, the authors reported that among adult females, who considered their work physically stressful to the cervicobrachial musculature, 'meticulous occlusal adjustment aimed at elimination of all occlusal interferences' (p. 491) at the initiation of the investigation and during annual follow-ups decreased later demand for therapy of symptoms located in the head, face and/or cervicobrachial regions. These findings complement results from an earlier randomized controlled trial in which it was shown that regular biannual occlusal adjustment over a period of 4 years among healthy children and adolescents led to a statistically significant reduction of the incidence of symptoms and signs of temporomandibular disorders (TMD) (Kirveskari *et al.*, 1998).

First of all, the authors need to be congratulated on their methodologically sound longitudinal studies in which participants were monitored over a period of 48 months. Based on their findings, Kirveskari and Jämsä (2009) consider 'occlusal interferences as a structural health risk for symptoms in the head and neck region' (p. 492). While we agree that the results indicate that the occlusion may have an influence on the neuromuscular system of individual patients, we consider the notion 'that occlusal interferences are a health risk' (p. 494) an over-interpretation that is likely to obfuscate a more physiological explanation. In fact, we believe that the outcome of both investigations may be construed as follows:

It is well-established in occupational physiology that repetitive, long-lasting, low-intensity muscle loading, which selectively and continuously activates small type I motor units (Cinderella hypothesis), may lead to muscle pain due to metabolic exhaustion and damage of single motor units (Zennaro *et al.*, 2004; Visser and van Dieën, 2006; Staal *et al.*, 2007). It is conceivable that a similar mechanism may also occur within masticatory muscles of susceptible patients during sustained motor activity, such as prolonged tooth grinding, jaw clenching or non-physiological daily tooth contacts (cf. Chen *et al.*, 2007).

There is good evidence that based on the inherent functional heterogeneity of the masticatory muscles and their resulting differential activation behaviour (Blanksma and van Eijden, 1995; Schindler *et al.*, 2005, 2006; Farella *et al.*, 2009), even minimal positional changes of the mandible, as induced, for instance, by occlusal adjustment, build-up of tooth surfaces (Kirveskari and Jämsä, 2009, p. 491) or insertion of oral splints (Schindler *et al.*, 2000), alter the recruitment patterns within the masticatory muscles (Schindler *et al.*, 2005, 2006). These biomechanical modifications, in turn, are likely to reduce stress concentrations in particular muscle regions and, as a consequence, unload localized painful areas (Türp and Schindler, 2003). Hence, systematic (and periodic) alterations of occlusal surfaces at specific time intervals, as carried out in the two investigations discussed here (Kirveskari *et al.*, 1998; Kirveskari and Jämsä, 2009), may have decreased the duration and amount of stereotyped loading of motor units of susceptible subjects and, therefore, reduced the incidence of muscle pain.

The idea that any therapeutic increase or decrease of the mandibular position (of course, within a physiological range) may be useful for regional pain reduction in the temporomandibular joints and/or the masticatory muscles [and the adjacent cervicobrachial musculature (cf. Ciancaglini *et al.*, 1999; Sipilä *et al.*, 2002; Rantala *et al.*, 2003)] may serve as an explanatory model not only for the reported effects after occlusal adjustment (Kirveskari *et al.*, 1998; Kirveskari and Jämsä, 2009) but also for any other therapeutically induced alteration of the three-dimensional intermaxillary relationship. Therefore, and considering the 'practically universal presence of interferences', it is appreciated that Kirveskari and Jämsä (2009) judiciously eschew generalized 'prophylactic elimination of occlusal interferences'.

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